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(58) Field of search
C5D

(54) **Liquid detergent compositions with magnesium salts**

(57) Heavy-duty liquid detergents and cleaners are formulated as oil-in-water microemulsions that exhibit phase stability. The compositions contain grease-cutting solvents as the oil phase. The compositions also contain magnesium salts to further enhance grease-removal performance. Fatty acids and soaps may be used both as a microemulsion stabilizers and as detergency builders.

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SPECIFICATION

**Liquid detergents with magnesium salts**

*Technical field*

The present invention relates to liquid detergents which comprise a solvent ingredient and a magnesium salt. These compositions can be used in the form of a simple fabric pre-spotter, in fully-formulated laundry detergents, or as hard surface cleaners, with particularly noteworthy benefits on greasy stains.

*Background*

Detergent formulators are faced with the task of devising products to remove a broad spectrum of soils and stains from fabrics. Chemically and physico-chemically, the varieties of soils and stains range the spectrum from primarily greasy/oily, through proteinaceous and carbohydrate, to inorganic, and detergent compositions have become more complex as formulators attempt to provide products which handle all types, concurrently. For example, protease enzymes are commonly used in detergents for blood and gravy stains; amylase enzymes are used for carbohydrate stains; nonionic surfactants are used for greasy/oily stains; and anionic surfactants and builders are used for particulate soil. Bleach is used to chemically degrade stains that are not amenable to removal by less rigorous treatment.

The so-called "greasy" stain is an especially common type of stain and is ubiquitous, both on fabrics and on hard surfaces such as walls, floors, counter tops, and the like. Stains identified generically as "greasy" can actually be of several chemical types, ranging from lipid, liquid hydrocarbon, solid hydrocarbon, and silicone oil, to the true lubricating greases. Typically, the greasy stain will have associated with it various color bodies, particulate matter such as clay, vegetable matter, body soil, carbon black, and the like. There is a continuing search for improved means for handling such stains.

The present invention employs grease-removal solvents and magnesium salts to remove greasy stains from fabrics and hard surfaces.

The use of solvents of the type employed in this invention as grease and oil removal ingredients in cleaners of various types is well-known commercially and from the patent literature. See, for example, U. S. Patent 2.073.464; EPO Applications 0 072 488 and 81200540.3; British Patent 1.603.047.

The use of various magnesium salts in granular detergents is well-known.

However, the use of solvents in combination with magnesium salts in the manner disclosed herein is not believed to have been contemplated, heretofore. In particular, the use of magnesium salts in water-based liquid detergent compositions is not common, inasmuch as the magensium causes precipitation of many detersive ingredients, especially fatty acids. In the present compositions the solvent prevents this precipitation from occurring.

*Summary of the invention*

The present invention relates to water-based liquid compositions and processes from removing greasy stains, and the like, from fabrics and hard surfaces, by means of a solvent (especially solvents such as isoparaffinic hydrocarbons, kerosene, petroleum fractions, d-limonene or mixed citrus terpenes, fatty alcohols, benzyl alcohol and mixtures thereof) and a magnesium salt (as described more fully hereinafter) typically at a weight ratio of solvent:magnesium of 200:1 to 2:1, preferably at least 10:1. The invention encompasses fully-formulated detergent and cleaner compositions in the form of homogeneous oil-in-water emulsions which comprise conventional detergency ingredients such as detergency builders, enzymes, detersive surfactants, and the like, characterized in that such compositions contain at least about 5% weight of the aforesaid mixture of solvent and magnesium salts. Preferably, such fully-formulated detergent compositions contain at least about 5% of the solvent and at least about 0.1% of the magnesium salt. In a highly preferred embodiment, the compositions also contain a polyamine ingredient to aid in removing particulate soils, and fatty acid/soap as a detergent builder.

*Detailed description of the invention*

The essential solvent and magnesium salt, as well as the surfactant and preferred polyamine components and other optional ingredients used in the practice of the present invention, are described in more detail, hereinafter. All percentages and ratios mentioned in this specification are by weight, unless otherwise stated.

*Solvent*– The solvents employed herein can be any of the well-known "degreasing" solvents commonly known for use in, for example, the commercial laundry and drycleaning industry, in the hard-surface cleaner industry and the metalworking industry. Typically, such solvents comprise hydrocarbon or halogenated hydrocarbon moieties of the alkyl or cycloalkyl type, and have a boiling point well above room temperature. Benzenoid hydrocarbons are not suitable for use in compositions which may come in contact with the user's skin, due to toxicity problems.

The formulator of compositions of the present type will be guided in the selection of solvent partly by the need to provide good grease-cutting properties, and partly by aesthetic considerations. For example, kerosene hydrocarbons function quite well in the present compositions, but can be malodorous. Kerosene

can be used in commercial laundries. For home use, where malodors would not be tolerated, the formulator would be more likely to select solvents which have a relatively pleasant odor, or odors which can be reasonably modified by perfuming. Such solvents include, for example, the terpenes and terpenoid solvents obtainable from citrus fruits, especially orange terpenes and d-limonene. Benzyl alcohol is another relatively pleasant smelling solvent for use herein. Mixtures of orange terpene and benzyl alcohol are especially suitable for removing certain types of stains, e.g., dirty motor oil, and marker ink from floor tile.

The preferred solvents used herein are n-paraffins and the mono- and bicyclic mono-terpenes, i.e., those of the hydrocarbon class, which include, for example, the terpinenes, limonenes and pinenes, and mixtures thereof. Highly preferred materials of this type are d-limonene and the mixture of terpene hydrocarbons obtained from the essence of oranges (e.g. cold-pressed orange terpenes and orange terpene oil phase ex fruit juice). Also useful are, for example, terpenes such as dipentene, alpha-pinene, beta-pinene and the mixture of terpene hydrocarbons expressed from lemons and grapefruit.

The examples disclosed hereinafter describe various other solvents which can be used in the present compositions.

*Magnesium Salts* – The compositions herein can be formulated using any convenient magnesium salt. Of course, the formulator will choose those magnesium salts which are acceptable from the standpoint of toxicology and ecology. Simple magnesium salts such as magnesium hydroxide, chloride, bromide, acetate, propionate, and sulfate are inexpensive and typical of the salts useful herein.

Magnesium hydroxide is the preferred salt for use herein since it can be used to adjust the pH of the compositions. In an especially preferred mode, magnesium hydroxide is used to neutralize the acid form of the anionic detersive surfactants or soap used in the present compositions, thereby providing the magnesium salt in the form of magnesium surfactant or magnesium soap moieties, which are especially useful in preparing homogenous, oil-in-water microemulsions.

*Detersive surfactants* – The compositions of this invention will typically contain organic surface-active agents ("surfactants") to provide the usual cleaning benefits associated with the use of such materials.

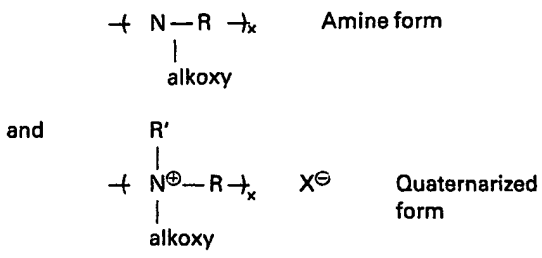
Detersive surfactants useful herein include well-known synthetic anionic, nonionic, amphoteric and zwitterionic surfactants. Typical of these are the alkyl benzene sulfonates, alkyl- and alkylether sulfates, paraffin sulfonates, olefin sulfonates, alkoxylated (especially ethoxylated) alcohols and alkyl phenols, amine oxides, $\alpha$-sulfonates of fatty acids and of fatty acid esters, and the like, which are well-known from the detergency art. In general, such detersive surfactants contain an alkyl group in the $C_9-C_{18}$ range; the anionic detersive surfactants can be used in the form of their sodium, potassium or triethanolammonium salts but it is to be understood that the presence of magnesium cations in the compositions usually means that at least some portion of the anionic surfactant will be in the magnesium salt form; the nonionics generally contain from about 5 to about 17 ethylene oxide groups. U. S. Patents 4.111.855 and 3.995.669 contain detailed listings of such typical detersive surfactants. $C_{11}-C_{16}$ alkyl benzene sulfonates, $C_{12}-C_{18}$ paraffinsulfonates and alkyl sulfates, and the ethoxylated alcohols and alkyl phenols are especially preferred in the compositions of the present type.

The surfactant component can comprise as little as 1% of the compositions herein, but preferably the compositions will contain 1% of the compositions herein, but preferably the comositions will contain 1% to 40%, preferably 10% to 30%, of surfactant. Mixtures of the ethoxylated nonionics with anionics such as the alkyl benzene sulfonates, alkyl sulfates and paraffin sulfonates are preferred for through-the-wash cleansing of a broad spectrum of soils and stains from fabrics.

*Fatty acid/soap ingredient* – Fatty acids (generally $C_{10}-C_{18}$ chain length) and their salts (i.e., common "soaps", for example, alkali metal soaps) can be used in the present compositions not only for their detersive-surfactant properties, but also to provide an additional detergency builder function by virtue of their ability to interact with water hardness cations, especially calcium. As disclosed hereinabove, fatty acids, water-soluble soaps, and especially magnesium soaps, are particularly useful when preparing fully-formulated, homogeneous oil-in-water liquid detergents of the present type. Usage levels of 0.5% – 50% are typical.

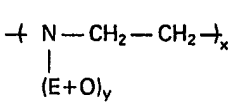
*Polyamines* – Polyamine materials are optional, but highly preferred, ingredients in the present compositions by virtue of their ability to co-act with the solvent and magnesium salt to remove the solid material that is present in many greasy stains (e.g., carbon black in motor oil stain; clay and color bodies in cosmetic stain). It is to be understood that the term "polyamines" as used herein represents generically the

alkoxylated polyamines, both in their amine form and in their quaternarized form. Such materials can conveniently be represented as molecules of the empirical structures with repeating units:




wherein R is a hydrocarbyl group, usually of 2-6 carbon atoms; R' may be a $C_1-C_{20}$ hydrocarbon; the alkoxy groups are polyethoxy, polypropoxy, and the like, with polyethoxy having a degree of polymerization of 2-30, most preferably, 10 to 20; x is an integer of at least 2, preferably from 2-20, most preferably 3-5; and $X^-$ is an anion such as halide or methylsulfate, resulting from the quaternization reaction. The anion $X^-$ is of no particular consequence to performance of the polyamine in the present context, and is mentioned only for completeness in the above formula.

The most highly preferred polyamines for use herein are the so-called ethoxylated polyethylene imines, i.e., the polymerized reaction product of ethylene oxide with ethylene-imine, having the general formula:




wherein x is an integer of 3 to 5 and y is an integer of 10 to 20.

Polyamines typically will comprise at least about 0.2% of the preferred compositions herein, generally 0.5%-5%.

*Other optional ingredients* – The compositions herein can contain other ingredients which aid in their cleaning performance. For example, it is highly preferred that through-the-wash detergent compositions contain a detergent builder and/or metal ion sequestrant. Compounds classifible and well-known in the art as detergent builders include the nitrilotriacetates, polycarboxylates, citrates, water-soluble phosphates such as tri-polyphosphate and sodium ortho- and pyro-phosphates, silicates, and mixtures thereof. Metal ion sequestrants include all of the above, plus materials like ethylenediaminetetraacetate, the amino-polyphosphonates and phosphates (DEQUEST) and a wide variety of other poly-functional organic acids and salts too numerous to mention in detail here. See U. S. Patent 3.579.454 for typical examples of the use of such materials in various cleaning compositions. In general, the builder/sequestrant will comprise about 0.5% to 15% of the composition. Citrate is one of the most preferred builders since it is readily soluble in the aqueous phase of heavy-duty liquid detergent compositions. Such ingredients are also useful in hard-surface cleaners.

The laundry compositions herein also preferably contain enzymes to enhance their through-the-wash cleaning performance on a variety of soils and stains. Amylase and protease enzymes suitable for use in detergents are well-known in the art and in commercially available liquid and granular detergents. Commercial detersive enzymes (preferably a mixture of amylase and protease) are typically used at leves of 0.001% to 2%, and higher, in the present compositions. Ingredients such as propane diol and/or formate and calcium can be added to help stabilize the enzymes in well-known fashion, according to the desires of the formulator.

Moreover, the compositions herein can contain, in addition to ingredients already mentioned, various other optional ingredients typically used in commercial products to provide aesthetic or additional product performance benefits. Typical ingredients include pH regulants, perfumes, dyes, optical brighteners, soil suspending agents, hydrotropes and gel-control agents, freeze-thaw stabilizers, bactericides, preservatives, suds control agents and the like.

Water or water-alcohol (e.g., ethanol, isopropanol, etc) mixtures are used as the carrier vehicle, and alkylated polysaccharides can be used to increase the stability and performance characteristics of the compositions.

The compositions herein are preferably formulated in the slightly acid to alkaline pH range, generally in the range of pH 6.5-8.0, preferably about 7.0-7.5. Materials such as sodium hydroxide, sodium carbonate or the mono-, di-, and tri-ethanolamines can be used to adjust and buffer the pH, as desired. Preferably, magnesium hydroxide is used.

The compositions herein are in liquid form, which can be prepared by simply blending the essential and

optional ingredients in the aqueous carrier. As mentioned hereinabove, fatty acid or soap can be used in such liquid compositions to provide exceptionally clear, stable, homogeneous, oil-in-water microemulsions of the solvent in the aqueous carrier.

In one process aspect, the compositions can be used to pre-treat soiled fabrics by rubbing a few milliliters of the composition directly onto and into the soiled area, followed by laundering, in standard fashion. In a through-the-wash mode, the compositions are typically used at a concentration of at least 500 ppm, preferably 0.1% to 1.5% in an aqueous laundry bath at pH 6.5-10 to launder fabrics. The laundering can be carried out over the range from 5°C to the boil, with excellent results.

For use as hard-surface cleaners, the compositions are diluted with water, or used full-strength, all in standard fashion.

*Industrial application*

The following examples describe a variety of formulations which can be prepared in the manner of the present invention using the mixed solvent/magnesium salt ingredients. The examples are given by way of illustration and are not intended to be limiting of the scope of the invention. In the highly preferred polyamine-containing formulations listed, the terms "x" and "y" are stated in parentheses to designate the degree of polymerization and degree of alkoxylation of the polyamine. For some "polyamines", the designation R' is also included, thereby denoting a quaternarized polyamine. For such quaternarized materials, the resulting anion $X^-$ is of no consequence to cleaning performance, and is not designated. In all polyamine examples, R is $-CH_2-CH_2-$ and alkoxyl is ethoxyl, unless otherwise specified.

*Cleaners, cleansers and industrial laundry products*

The following examples relate to liquid hard surface cleaners especially adapted for cleaning environmental surfaces such as floor, walls, windows and the like.

The "cleanser" compositions contain an abrasive, whereas the "cleaner" compositions do not. It will be appreciated by the formulator that the following compositions are typical, and are not intended to limit the scope of this invention. For example, stronger (so-called "industrial-strength") compositions can be prepared by increasing the concentrations of solvent, the surfactant, or both, by raising pH well into the alkaline range, and the like. For window cleaners, the concentation of surfactant is generally kept low to avoid over-sudsing, and the use of materials which contribute to filming is avoided. All such matters are within the routine skills of the formulator.

*Example I*

A hard-surface cleaner especially for use on greasy material in particular marker ink and bathtub soap residues, is as fo

| *Ingredient* | *Percent* |
|---|---|
| Paraffin sulfonate (Na) | 2.5 |
| $C_{12}$ Alkyl benzene sulfonate (Na) | 2.0 |
| Coconut soap (acid form) | 0.7 |
| Ethoxylated alcohol $C_{9-11}EO_8$ | 3.0 |
| Orange terpene | 3.0 |
| Benzyl alcohol | 1.5 |
| Iso-propanol | 2.0 |
| Sodium citrate . $2H_2O$ | 3.5 |
| Magnesium hydroxide | 0.5 |
| Water, perfume (minor) | to 100 |

*Example II*

A liquid cleanser with good stability, good particulate soil removal and excellent surface shine n solid surfaces is as follows:

| *Ingredient* | *Percent* |
|---|---|
| Paraffin sulfonate | 8.0 |
| EDTA | 2.5 |
| Dipentene | 6.0 |
| D-limonene | 2.0 |
| Butyl carbitol (T.M.) | 2.0 |
| Coconut soap | 0.5 |
| Polyamine (x=2; y=15) | 1.0 |
| Ethanol | 2.5 |
| Magnesium acetate | 2.0 |
| Triethanolamine | to pH 7.7 |
| Water and minors | to 100% |

*Example III*

An industrial hard surface cleaner is as follows.

| *Ingredient* | *Percent* |
|---|---|
| Paraffin oil (deodorized) | 10.0 |
| Sodium tripolyphosphate | 4.0 |
| $C_{12}$ Alkyl benzene sulfonate | 3.0 |
| $C_9$ Alkyl phenol ethoxylate (EO6) | 2.5 |
| Tallow fatty acids | 1.5 |
| Nitrilotriacetic acid | 3.0 |
| Magnesium hydroxide | 0.5 |
| Water | to 100% |

The composition of Example III can be modified by adding 10-15% finely powdered pumice as a scouring abrasive.

*Solvent selection*

As disclosed hereinabove, final selection of the solvent system for use in the present compositions will be dependant upon soil type and load, aesthetics (odour) etc. However, a number of criteria can be used to guide this selection. For example, the solvent should be substantially water immiscible; and, it should of course be capable of solubilizing a broad range of problem greasy soils. In this latter respect thermodynamic solubility parameters (Hansen Parameters) are useful in making the solvent selection.

Any solvent can be described by the Hansen Parameters $\delta_d$, $\delta_p$, $\delta_h$ : $\delta_d$ being the dispersion component; $\delta_p$ the polarity component; and $\delta_h$ the hydrogen bonding component. Likerwise, key greasy problem soils can be described by "pseudo" Hansen Parameters. In order to do this the solubility of each greasy stain in a broad range of solvents of different Hansen Parameters is first assessed. This can be done by immersing the greasy stain on a range of different fabric types (cotton, polyester cotton, acrylic) in each solvent in turn for a fixed

time (say, 5 minutes) under fixed agitation. On removal, excess solvent is drained-off and the stained fabric is washed for 5 minutes in cool water containing 1% concentrati n of a typical liquid laundry detergent. Following final rinsing in cold water and drying, the stain removal can be assessed visually or by any other suitable technique. By proceeding in this way, those solvents giving best removal of each problem greasy stain can be identified, and thereby the range of each Hansen Parameter required for optimum removal of that particular stain can be assessed. Thus, for each stain a map of Hansen Parameters can be developed, and solvent/solvent combinations can be selected on this basis to give the target performance profile.

Although not intended to be limiting of the present invention, the above technique indicates that solvent/solvent compositions with Hansen Parameters in the range $\delta_d$ (7 to 9), $\delta_h$ (0 to 7) $\delta_p$ (0 to 4), are key for formulating microemulsions with superior greasy stain removal performance. The solvent combination can be targeted against particular greasy stains, such as motor oil, where the optimum Hansen Parameter range is $\delta_d$ (7 to 9), $\delta_h$ (0 to 4) $\delta_p$ (0 to 3) or marker ink, where the optimum range is $\delta_d$ (7 to 9), $\delta_h$ (2 to 11), $\delta_p$ (2 to 7), or targeted more broadly against mixed stains by selecting an intermediate point in the range of Hansen Parameters.

Preferred solvents and solvent mixtures herein, especially: orange terpenes (d-limone), normal paraffins ($C_{12\ to\ 25}$); cyclohexane; kerosene; orange terpene/benzyl alcohol; (60/40), n-paraffins ($C_{12\text{-}15}$) / hexanol (50/50) fall within the Hansen Parameters, as stated.

These solvents and solvent mixtures are typically used at concentrations of 5-20%, preferably 5-10%, in the present compositions. Slightly polar solvents such as benzyl alcohol 1-butanol or n-hexanol are typically used with water-immiscible solvents such as terpenes and paraffin oils at levels of 0-10%. Used in the manner herein, such solvents compatibilize 0.1% to 5% magnesium salts in the compositions. Preferred heavy-duty microemulsion detergents also contain 10-20% of fatty acid or soap, which help maintain the solvent in microemulsion form and provide a builder function.

The compositions herein with high concentrations of surfactant and fatty acid/soap may be packaged in high density polyethlene bottles without solvent loss.

The following examples relate to compositions within the scope of this invention with solvents that are particularly suitable in industrial, heavy-duty laundry and cleaning plants, and the like. It will be appreciated by the formulator that some of the solvents employed in such compositions may be unsuitable for general home use, due to malodors, potential for skin irritation, low flash points, and the like. However, such compositions are entirely suitable for use under properly controlled conditions by professional operators who take such matters into consideration. In Examples IV-IX, the pH is adjusted in all compositions with magnesium hydroxide, as indicated. All the other ingredients are listed as parts by weight.

| *Ingredient* | *IV* | *V* | *VI* | *VII* | *VIII* | *IX* |
|---|---|---|---|---|---|---|
| Stoddard solvent | 100 | – | – | – | – | 250 |
| Trichloroethylene | – | 10 | – | – | – | – |
| Naphtha | – | – | 30 | – | – | – |
| Petroleum Ether (b.p.80-85°C) | – | – | – | 60 | 100 | – |
| Mineral spirits | – | – | – | 20 | – | – |
| Benzyl alcohol | – | – | – | – | 100 | – |
| Butyl carbitol (T.M.) | – | – | – | – | – | 50 |
| Polyamine (A-F*) | 5(A) | 10(B) | 15(C) | 100(D) | 20(E) | 150(F) |
| Water | 100 | 100 | 200 | – | 250 | 350 |
| Coconut fatty acids | – | – | 25 | – | – | – |
| $C_{12}$ alkyl benzene sulfonic acid | 50 | 5 | – | – | 10 | 20 |
| $C_{12-15}$ alcohol ethoxylate (EOAvg 9) | 50 | – | – | – | – | 20 |
| $C_9$ alkyl phenol (ethoxylated EO Avg 6) | – | 2 | 10 | 100 | 10 | – |
| $Mg(OH)_2$ to pH shown | 7.0 | 7.1 | 7.5 | 8.0 | 7.7 | 8.1 |

* Polyamines A–F used in Examples IV-IX have the general formulae disclosed hereinbef re and are as follows:

*A* x = 2;y = 2;R = ethylene ; alkoxy = ethoxy

*B* x = 20;y = 30;R = propylene ; alkoxy = propoxy

*C* x = 3;y = 15;R = ethylene ; alkoxy = ethoxy ; R' = butyl

*D* x = 5;y = 9;R = butylene ; aloxy = butoxy

*E* x = 30;y = 10;R = hexylene ; aloxy = ethoxy ; R' : dodecyl

*F* x = 3;y = 20;R = ethylene ; alkoxy = ethoxy ; R' = eicosyl

*Heavy-duty liquid detergents*

Having thus described a variety of compositions in accordance with the invention, special attention is now directed to highly preferred formulations which are particularly useful as heavy duty liquid detergents that are suitable for laundering all manner of fabrics in a typical home laundering operation. The heavy duty liquid detergents disclosed herein-after are formulated with a variety of detersive ingredients to provide excellent cleaning of a wide variety soils and stains, with particularly noteworthy benefits with regard to cosmetic and dirty motor oil stains.

It is to be understood that the following formulations are in the form of oil-in-water emulsions (wherein the solvent is considered the "oil" phase) and are most preferably in the form of substantially clear, homogeneous oil-in-water microemulsions. The formulator of heavy duty liquid detergents will appreciate that using water as the carrier phase in such compositions is a significant cost saving over the water-in-oil emulsions known in the art as spot removers, and the like, and will further appreciate that an aqueous carrier phase contributes importantly to ease-of-formulation, since water-soluble detersive ingredients can be more readily incorporated into oil-in-water emulsions than in water-in-oil emulsions. Surprisingly, when used in a pre-treatment mode, the oil-in-water emulsions herein are comparable in grease-cutting performance to water-in-oil emulsions, which have much higher concentrations of solvent.

*Example X*

A heavy-duty liquid detergent in the form of a clear, homogeneous oil-in-water emulsion is prepared as follows.

| *Ingredient* | *Parts by weight* |
|---|---|
| Ethanol | 3.0 |
| Magnesium Hydroxide | 0.6 |
| Potassium hydroxide (50% in water) | 6.0 |
| Alkyl ($C_{11.8}$) benzene sulphonic acid | 11.0 |
| Alkyl ($C_{14/15}$) ethoxylate (EO7) | 15.0 |
| Potassium citrate monohydrate (63.5% in water) | 4.8 |
| Dequest* 2060 S (TM) | 1.2 |
| Sodium formate (40% in water) | 2.5 |
| $Ca^{++}$ as $CaCl_2.6H_2O$ | 60 ppm |
| Orange Terpenes | 10.0 |
| Lauric/myristic acid (60/40) | 12.5 |
| Oleic acid | 2.5 |
| Maxatase** (TM) enzyme | 0.71 |
| Termamyl*** (TM) enzyme | 0.10 |
| Optical Brightener (Anionic) | 0.23 |
| Perfume | 0.5 |
| Dye | 20 ppm |
| Water | to 100 |
| Product pH | 7.3 |

* Diethylene triamine pentamethylene phosphonic acid (Monsanto)
** KNGS, supplier
*** NOVO, supplier

The above composition is prepared by blending the indicated ingredients to provide a clear, stable microemulsion. In laundry tests, particularly with a pre-treatment step, the composition gives excellent

performance on a wide variety of stains, especially cosmetics and dirty motor oil.

*Example XI*

The composition of Example X is modified by the addition of 1.5 parts by weight of tetraethylene pentamine ethoxylated with an average of 15 moles of ethylene oxide per nitrogen atom. The resulting composition is a clear, stable, homogeneous microemulsion at pH's above 6.9, especially in the range 7.2 to 7.4.

*Example XII*

The composition of Example X is modified by replacing the orange terpene solvent by a mixture of deodorized paraffin oil (7.5% of the total composition) and orange terpenes (2.5% of total composition). This change in the solvent component in no way detracts from the performance attributes of the composition, but allows the perfumer more latitude for introducing non-citrus perfume notes. Anionic optical brightener (0.01-0.5%) may be added, as desired.

Any of the foregoing examples may be modified by replacing the solvent with a mixture of paraffin oil or terpenes with n-hexanol, 1-butanol or benzyl alcohol.

CLAIMS

1. A liquid laundry detergent or hard surface cleaner containing conventional detergent ingredients, characterized in that it contains at least 5% of a mixture of grease-removal solvent and magnesium salt, said composition being in the form of an oil-in-water microemulsion.

2. A composition according to Claim 1 which contains at least 5% of the solvent and at least 0.1% of the magnesium salt.

3. A composition according to Claim 2 wherein the solvent comprises terpenes, paraffin oil, or mixtures thereof, or mixtures of terpenes or paraffin oil with benzyl alcohol or n-hexanol.

4. A composition according to Claim 3 wherein the magnesium salt is magnesium hydroxide, magnesium chloride or magnesium acetate.

5. A composition according to any of Claims 1-4 which additionally contains 0.5%-50% of a fatty acid or soap.

6. A composition according to Claim 5 formulated as a substantially clear oil-in-water microemulsion at a pH of 6.5 to 8.0.

7. A composition according to any of Claims 1-6 which also contains an alkoxylated polyamine.

8. A composition according to Claim 1, which comprises:

a) 5-20% of a solvent selected from orange terpenes, paraffin oil, and mixtures thereof;

b) from 0% to 10% of benzyl alcohol, n-hexanol, or 1-butanol;

c) 10% to 20% of fatty acid or soap;

d) 0.1% to 5% of magnesium salt; the balance of the composition comprising the water carrier and conventional detergent ingredients.

9. A composition according to Claim 8 formulated at a pH of 7-7.5.

10. A composition according to Claim 9 wherein the fatty acid or soap comprises a mix of lauric and myristic acids or soaps, and the magnesium salt is magnesium hydroxide.

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(51) INT CL⁴
C11D 3/50

(52) Domestic classification (Edition I)
C5D 6A1 6A4B 6A7 6B11A 6B11B 6B11C 6B11D 6B12B1 6B12E 6B12G1 6B12G2A 6B12G2B 6B12M 6B12N1 6B12N4 6B15 6B3 6B4 6B5 6B6 6C8

(56) Documents cited
GB A 2144763 EP A1 0080749

(58) Field of search
C5D
Selected US specifications from IPC sub-class C11D

ERRATUM

SPECIFICATION NO 2190681A

Page 12
Line 52 after said (second occurrence)
insert cosurfactant, 0.4% to 10% of said

THE PATENT OFFICE
29 December 1987

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